

# **CO225-SOFTWARE CONSTRUCTION**

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**E/16/203**

## **TUTORIAL 1**

### **1). What are the OOP principles?**

- \*Encapsulation
- \*Data Abstraction
- \*Polymorphism
- \*Inheritance

### **2). What is a class? What is the difference between a class and an object?**

A class is a user defined blueprint or prototype from which objects are created.

There are several differences between objects and classes. Objects are instances of a particular class while class is just a blueprint from which objects are created.

Classes have logical existence while objects have physical existence. Classes don't take any memory when initiating while Objects take memory when initiating.

The class has to be declared only once while Objects can be declared several times depending on the requirement.

### **3). Explain the difference between final and finally keyword**

Final is used to apply restrictions on class, method and variable. Final class can't be inherited, final method can't be overridden and final variable value can't be changed.

Finally is used to place important code, it will be executed whether an exception is handled or not.

#### **4).What does the static keyword mean in Java?**

Using the Static keyword a member variable or a method which belongs to a particular class can be accessed without instantiating that particular class.

#### **5).Explain the difference between interface and abstract class. Give two examples of where you would use an abstract class and interface.**

Main difference is that Java interface is implicitly abstract and cannot do implementations. Also variables created in interface are final in default while abstract class can have non final variables such as public private etc.

Furthermore members in java interface are public in default while abstract class have the usual flavors of class members like private, protected, etc..

If i want to create a class where i don't need to do any implementations on that class i prefer java interface for example if i need complex number class to do complex number calculations i can do it in java interface with methods to get absolute values summations etc. and there is no way those methods will have modifications as those are standard mathematical equations.

But if i create a class which i need some of the methods in that class modified in another way in another class i use abstract class.such as in Inheritance.

#### **6).What are the two types in Polymorphism?**

- \*Compile time polymorphism (static binding)
- \* Runtime polymorphism

#### **7). What is multithreading? Why is the use of it?**

Multithreading in Java is a process of executing multiple threads simultaneously.

The main purpose of multithreading is to provide simultaneous execution of two or more parts of a program to maximum utilize the CPU time.

**8).What are the two types in thread creation? Why are there two types there?**

- extends Thread class.
- implement Runnable interface

Extending the class inherits the methods and data members, fields from the class Thread. In this process only one class can be inherited from the parent class Thread.

Implementing Runnable interface overcomes the limitation of inheriting from only one parent class Thread.

**9). Is multiple inheritance allowed in Java? What are the difficulties in multiple inheritance?**

No java doesn't allow it

There could be ambiguities arise in multiple inheritance such as in diamond problem.

In brief,assume a class B and C is inherited from class A and both these B,C override a method in A.Now if another class D is inherited from both B and C(multiple inheritance),and called that overridden method,,,,,, now ambiguity arised!! What method should be called?? Overridden method in B or overridden method in C???

**10). What is overloading and what are the advantages of overloading?**

Overloading means having different methods in same name each of which different by its signatures such as parameters,parameter types or number of parameters.

Method overloading increases the cleanliness of the code and also it increases readability of the code.

**11). How many constructors can be there for a single class?**

65535

**12). How to call a method in a base class without creating an instance of that class?**

Base class should be static and calling class should be inherited from that class

If it is a derived class use base keyword

**13). Given 3 classes, A, B, C and methodA() and methodB() in classes A and B respectively, how can you make sure that these 2 methods are available for use in class C?**

Class B should be inherited from Class A and Class C should be inherited from class B

Method A and Method B should be public

**14). Explain the advantages of encapsulation.**

In java, encapsulation binds methods, variables, classes together based on our requirement.

Main advantage of this is programmer can restrict, limit or hide the user from accessing inner classes methods variables etc. increasing safety of the code and data

Furthermore with this we can make the data as read-only or write-only as we require it to be. It also improves the maintainability and flexibility of code. And encapsulation also increases the reusability of a code block again and again it is also easy to test the code.

**15). What is the difference between public class and public final class?**

Main difference is Public classes can be extended using extends keyword (can use for inheritance) but public final class cannot be extended. it is final.